UNITED NATIONS

ECONOMIC AND SOCIAL COUNCIL

Distr.
LIMITED

E/ECA/POP/3B
14 October 1983

ENGLISH

Original :
FRANCAIS

ECONOMIC COMMISSION FOR AFRICA

Agenda Item 6

Second African Population Conference
(organized in co-operation with the United Nations Fund for Population Activities)

Arusha, United Republic of Tanzania

9 - 13 January 1983

RELATIONSHIPS BETWEEN POPULATION AND CERTAIN DEVELOPMENT VARIABLES IN AFRICA*

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I. INTRODUCTION

1. The problem of the relationships between population and development is complex and controversial. It is complex because "population" and "development" are not independent elements but involve a whole network of relationships and hence of important interactions; these relationships, moreover, are controversial because our knowledge of the very process of development is still imperfect.

2. Obviously, significant progress has been made in this field in the last two decades, but there is no doubt that "Imagination and vision have not yet penetrated into the intricate web of individual and socio-cultural behaviour to determine the basic nature of their interactions with economic growth and social progress". 1/ Indeed, at the moment, we have not yet built up a theoretical framework which includes conceptual and methodological aspects and takes into account demographic, socio-economic and cultural factors as well as considerations of a global development policy. For example, there is no unanimity 2/ on the theory of demographic transition, which involves an enormous effort to try to organize from a dynamic viewpoint the various demographic indices both in their reciprocal relationships and in their relationships with the economic and social factors with which they are interlinked. It is therefore difficult, during the present stage of our knowledge, to pinpoint the role of population and development, either individually or jointly, in the process of growth. This is particularly true in Africa where the statistical data essential for making analyses and drawing conclusions are still inadequate or even nonexistent.

3. In these circumstances, this report will confine itself to a study, in Africa, of certain socio-economic indicators of essential needs, namely, those relating to education, health, food, employment, both in their reciprocal relationships and in their relationships with the population factor. But first, we shall briefly examine the present demographic situation and its future prospects.

4. This study will serve not only to show the nature of, and interrelationship between, demographic, economic and social factors, but also to bring out the scope of the effort which the African countries must make in their struggle against underdevelopment, taking into account their demographic growth.

1/ United Nations: The Determinants and Consequences of Population Trends. Department of Economic and Social Affairs, Population Studies, No. 50, New York, 1978, Vol. I, 661 pages.

2/ On this subject, see especially: BOUTE J., "La transition demographique comme cadre theorique", Recherches Economiques de Louvain, 1965, Vol. 31, No. 8, pp. 695-709; CONDE J., La transition demographique appliquee a l'Afrique Tropicale avec comme implications les variables de la sante, de l'education, de l'economie. OECD, Paris, 1971, 225 pages; COALE A.J., "The Demographic Transition" in The Population Debate: Dimensions and Perspectives, papers of the World Population Conference, Bucharest, 1974, Vol. 1, pp. 347-355.

II. PRESENT DEMOGRAPHIC SITUATION AND FUTURE PROSPECTS

5. The present demographic situation in Africa is characterized by a sharp decline in mortality while fertility remains at high levels. This has resulted in a general rise in population which is unprecedented and which is causing profound anxiety. For example, between 1960 and 1980, in 38 African countries, the mortality rate dropped by 29.5 per cent on the average. However, this average conceals big differences between countries: the extremes in mortality rates range from -9.7 percent in Upper Volta to -56.2 percent in Tunisia. During the same period, the drop in the birth rate was much smaller: 3.2 percent on the average. The extremes ranged from -0.2 percent in Madagascar and Senegal to -28.6 percent in Tunisia. The sharpest declines took place in North Africa: Libya (-8.2 percent), Algeria (9.3 percent), Morocco (-15.3 percent), Egypt (-15.9 percent) and Tunisia (-28.6 percent). In some countries south of the Sahara the birth rate increased slightly, for example, in Rwanda, Central African Republic, Lesotho, Congo and Malawi (extreme values: 4.1 and 5.8 percent) 3/.

6. With its sharp decline in mortality coupled with a generally high birth rate (i.e. 45 percent or over), Africa remains the continent with the highest population growth in the world. The rates of growth vary between 2.5 percent (Central Africa) and 3.1 percent (East Africa). At this rate, it is estimated that the population of Africa will not be stabilized until the year 2110, nearly 80 years after Europe. By then, Africa's population will have increased by 1.6 billion and will be 2.1 billion, 20 percent of the world population (as compared with 10 percent in 1980) 4/.

7. The concern at this situation is all the more justified because in most countries recent trends in mortality have generally been unrelated to economic progress. 5/ Also, the effort these countries must make to combat underdevelopment is often disproportionate to their ability to mobilize the necessary resources to make up for the accompanying rise in the population and to sustain economic growth for the achievement of increased social wellbeing. In view of the enormity of the problem and the paucity of the means available, the African countries must implement, more urgently than elsewhere, programmes which will meet the essential needs of the population. The golden rule must be: "Something for all rather than all for some."

3/ The data used in this study are derived essentially from the following documents: World Bank: World Development Report, 1982, Washington D.C., 1982, 172 pages; United Nations: Demographic Yearbook 1981, Department of Economic and Social Affairs, New York, 1983.

4/ See Tabah, L., : "Africa fastest in growth rates", Journal of the UNFPA, 1982, Vol. 9, No. 1, pp. 1-26. These estimates are obviously not definitive. As in the past, basic revisions may be made in the light of the relatively rapid (in comparison with the West) decline in birth rates which may occur in Africa before the end of the century. This prospect, however, does not diminish in any way the implications of the present rate as regards development.

5/ In Africa, as in most developing countries, the decline in mortality is probably more the result of certain incidental activities and of general hygienic improvements (use of soap, for example) than a reflection of real economic and social progress.

III. SOME ASPECTS OF DEVELOPMENT RELATED TO POPULATION

Preliminary Observations

8. Let us now examine certain demographic and socio-economic indicators with a view to identifying possible correlations and bringing out, as far as possible, the effort which the African countries must make to meet essential needs, especially those related to health, education, employment and food. Table 1 and Annex A contain a list of the indicators selected for each aspect of development: health (X_{13} and X_{22}), education (X_2, X_{15} and X_{16}), food (X_{10} and X_{14}), employment (X_{18} and X_{19}), demographic growth (X_1, X_3 to X_9, X_{12}) and economic growth (X_{11}, X_{17}, X_{20} and X_{21}). 6/ Except where otherwise stated, these indicators relate to the years 1960 and 1980; they are available for 38 African countries each of which, in 1980, had a population of at least 1 million inhabitants. 7/ Of course, in order to identify the correlations between demographic and socio-economic factors, to appreciate the extent to which the essential needs are met in a given country and to bring out the trends in the different development indicators, we should have adopted a longitudinal approach. However, such an approach would have required, for the last 20 years, for example, chronological series by country and by indicator. Such data are obviously not yet available for the large majority of African countries. In the absence of a better method, we have tried to take advantage of the available data by adopting a transversal approach: for a given period we studied a number of countries at different stages of development, treating them as a whole (imaginary, of course) observed at different times in their development. The period chosen is 1980; when the data permit, a comparison may be made between the situation in 1980 and that in 1960. Table 1 gives, for each indicator, the number of observations (countries), the average and the standard deviation, together with a percentage figure which gives an idea of the trend in the average for each indicator between 1960 and 1980.

9. It is clear from the table that the 38 African countries studied have generally speaking, put forward a considerable effort to further their development over the last 20 years. This effort is reflected mainly in a remarkable increase in literacy, especially among adults and young girls, a decline in child mortality and hence an increase in life expectancy at birth from 39 to 49 on the average, an increase in the active population working in services and in industry (which presupposes inter alia greater progress in industrialization and in manpower skills than at the beginning), a substantial improvement in the health care infrastructure (as a result of the decrease in the number of inhabitants per hospital bed) and in the per capita Gross National Product. But this effort has been costly. The last two decades have also been characterized by galloping inflation, a rapid increase of the population in general and, in particular, of the urban population, a low but persistent deterioration in food production per inhabitant, etc.

6/ It is understood, for example, that life expectancy, which is a purely demographic indicator, may also be used as a health indicator. The distribution of indicators among the different aspects of development has been made only for reasons of clarity.

7/ For this study, we assembled, for 38 countries, various data (grouped under 22 indicators) which were used in preparing tables 1 and 2. It was impossible to publish them as part of this study. However, they are available for any interested reader.

10. This broad picture, however, conceals substantial differences between countries especially as regards socio-economic factors. It suffices to examine the dispersion index of the indicators listed in table 1 to establish these differences. They show clearly that the African countries are now at very different levels of economic and social development and seem to justify the transversal approach adopted here - for lack of a better method - in order to analyse the possible correlations between demographic variables and the socio-economic indicators of essential needs. 8/

Education

11. In nearly all studies, both national and international, on the relations between population and development, education, especially at the primary level, appears not only as the most important factor of all essential needs but also as one of the important factors in social progress, manpower productivity and industrial growth.

12. Without going into detail, we may state simply that this is due mainly to the fact that education exerts an influence on the individual's capacity for learning, innovating and adapting. This privileged position of education, especially basic education, explains the remarkable efforts made in Africa during the last 20 years in this field. Nevertheless, Africa is still, at the moment, the region of the world with the highest adult illiteracy rate (65 percent) and where the proportion of children not enrolled in school has slightly risen. Besides the problem of the growing number of school-age children, we should also mention the problem, no less important, of the quality of education in Africa. The causes of this situation are so well known that we need not dwell on them.

13. An examination of the correlation matrix (Table 2) shows that the countries which, in 1980, achieved high rates of adult literacy are also those where basic education - especially of girls - is the most wide spread, where nutritional standards are the highest, where the health care infrastructure is better and where mortality not only is decreasing the most rapidly but is also lower. 9/ These results agree with the conclusions of the recent study by E.A. Fisher to the effect that the countries which are disadvantaged from the point of view of literacy - i.e. which have more than 66 percent illiterate adults - are also disadvantaged with regard to life expectancy, infant mortality, means of education, communication, nutrition, health services, food production and income. 10/

9/ For the nature of the relationships between the variables, the value and degree of significance of the correlation coefficient, the reader should refer to the correlation matrix.

10/ E.A. Fisher : "Illiteracy in its context", perspectives, 1982, Vol. 12, No. 2, pp. 163-171.

Health

14. In the field of health, reference is made increasingly to the idea of "primary health care" which, besides health itself, includes food production, education, access to safe water, sanitation, as well as medical treatment. According to this approach, in the countries with limited financial resources and a lack of qualified medical personnel (doctor-patient relationship) it is essential and extremely urgent to plan the health services in such a way as to stress health education and modest clinics in order to provide the greatest number of people with a minimum of preventive and curative medical care rather than to continue to promote the building of ultra-modern and costly health establishments which can meet the needs only of a small number of individuals.

15. Obviously, a health policy which puts into practice the principles of "primary health care" is likely to contribute substantially to the reduction of morbidity and mortality, and hence to an increase in the average standard of living, which, over the more or less long term, may become a prerequisite for the emergence of new ideas particularly about the size of the family. Among the indicators chosen in this study, the only one which has a negative relationship with the crude birth rate is the "speed of variation of the mortality rate".

16. A study of the correlation between the different indicators also reveals the importance of the relationships between health, education, nutrition and level of living. As has already been pointed out, the most favoured countries in the field of health (better ratio between population and number of hospital beds, relatively high proportion of the population with access to safe water, reduced mortality...) are generally also those with high literacy rates, a larger food production and daily calorie intake per inhabitant, a greater percentage of manpower in services and industry, higher per capita income and so on.

17. We have also pointed out that Africa is a continent where there are enormous regional disparities, especially as regards the socio-economic level. Thus, the situation described above is in fact more frequent in North Africa than in Africa south of the Sahara even if, in this latter region also, there are many inequalities.

Food

18. Like education and health, food is not only an objective but also a means of development because a malnourished human being cannot fully utilize or develop his physical and mental capacities and cannot therefore participate fully in the development effort nor derive benefit from it. 11/

11/ SOUMAH G.H., "Alimentation et croissance economique en pays sous-developpes (le cas de l'Afrique noire)", Cahiers Economiques et Sociaux, Universite de Kinshasa, IRES, 1971, Vol. IX, pp. 7-36.

19. A qualitative and quantitative deficiency of food, by physically undermining the human body, constitutes a factor which increases morbidity and is therefore a certain cause of death, especially among children. Besides its negative effect on the average living standard of the population, an inadequate and unbalanced food intake has harmful effects on manpower productivity and therefore on economic and social development.

20. Africa, especially in the region south of the Sahara, appears, however, not to be aware of the urgency of the problem. With regard to food production during the 1970s, a United Nations document states that "increase in productivity have been ..... particularly disappointing in Africa, where they have fallen significantly short of the rate of population increase." 12/ The data we have assembled show that, as compared with the period 1969-71 (base: 100), out of 38 African countries, only 5 have recorded in 1978-80 an increase in their average index of food production per inhabitant. These are: Libya (39 percent), Tunisia (20 percent), Cameroon (9 percent), Ivory Coast (7 percent) and Rwanda (6 percent). The same is true as regards the daily intake of calories per inhabitant.

21. Obviously, the correlations between indicators are too complex to allow facile generalizations but, on the basis of the links observed between variables, we may state that the countries which are favoured in food supply are also favoured in the fields of education and health. We are aware that in these fields especially black Africa has still a long way to go.

Employment

22. Like education, health and food, employment constitutes at the same time a means and an objective of any policy aimed at satisfying the essential needs of a people.

23. Employment not only allows the individual to participate in the production of goods and services - and hence in the development effort - but also provides him with an income and gives him self-esteem. On the other hand, unemployment is a cause of frustration, dehumanization, waste of resources and even of political instability. Lack of a job, and especially of a worthwhile job, deprives an individual of his dignity and his sense of personal worth and impedes his material and spiritual development and his creative potential.

24. One of the most difficult problems confronting nearly all the countries in the world - whatever their level of development - is that of unemployment and underemployment. Preliminary estimates by the ILO for 1975 showed, for example, that 40 percent of the population of the developing countries were either out of work or had work which was inadequately paid.

12/ United Nations: Review and Appraisal of the World Population Plan of Action. Department of International Economic and Social Affairs. Population Studies No. 71, ST/ESA/SER.A.71, New York, 1979, 60 pages.

25. In Africa, we have noted that in 1980 industry and services absorbed respectively on the average only 11.9 and 16.6 percent of the active population (see table 1), a total of 28.5 percent. 13/ Hence the large majority of the African population - a little over 70 percent - lives off on agriculture which, as we all know, is one of the least rewarding in the world. One of the obvious results of this rural poverty is the flight towards the cities. This, in turn has many negative effects on food production (which at the moment is not Africa's strong point) and on unemployment and poverty, thus undermining further the chances of development.

26. Hence, during an initial stage, the African countries, instead of favouring the establishment of high-tech industries employing only a tiny fraction of local manpower, must adopt a policy designed to create, at relatively lower costs, productive jobs in traditional and rural sectors which cannot only absorb a surplus of unskilled workers but also and above all can improve the quality and quantity of production.

27. The relationships between the different development indicators show clearly that a high degree of industrialization (measured by the percentage of the active population working in industry) accompanies rapid urbanization, very high per cepita income and a lower mortality which is declining rapidly. However, the problem for Africa, it appears, is thatof allocating scarce resources for the satisfaction of the many, urgent, essential needs of a rapidly increasing population. An integral and harmonious development based on the rural sector is possible in Africa without excessive external debt; this is not necessarily the case with a development that is based on a prestigious policy of industrialization, because of the absolute or relative paucity of immediately available domestic resources. More than ever, it seems, Africa needs to achieve economic autonomy aimed at the satisfaction of the population's essential needs, including employment.

IV. CONCLUSION

28. Africa is now going through a difficult period in its history mainly because of the combination of a rapidly declining death rate and a birth rate that is generally high. The African countries have a low capacity for mobilizing resources and need to restructure radically their national economies (more egalitarian distribution of goods and services, economy oriented more towards the domestic market). In these circumstances, present demographic trends may endanger the chances of development, for a rapid rise in the population requires a steady expansion in jobs,in agricultural productivity and in services such as education and health.

13/ In the industrialized countries the percentages for the same period are respectively 39 percent, 55 percent and 94 percent.

29. An examination of the different development indicators also shows that Africa has certainly made great efforts to further its development during the last two decades. Nevertheless, at the moment, Africa - especially south of the Sahara - remains one of the regions of the world where the essential needs of the population are inadequately met. It is also apparent that people who are disadvantaged as regards literacy are also disadvantaged as regards life expectancy, infant mortality, education, communication, nutrition, health, food production, employment and income. Unfortunately, such a situation is common in Africa. As a result, Africa still has a long way to go in these particular fields.

30. Finally, efforts must also be made in the field of research so as to acquire a better grasp, within each country (or group of countries), of the interrelationships between development and demographic growth, with a view to reducing the gaps in our knowledge in this field.

Table 1: Some development indicators in Africa, 1960-1980

*Number of observations (countries) used for the calculation of the average and the standard deviation.

	Demographic and Socio-economic Indicators	1960			1980			$\frac{(5)-(2)}{(2)} \cdot 100$
		n(*) (1)	Average (2)	Standard Deviation (3)	n(*) (4)	Average (5)	Standrad Deviation (6)	
X_1	Population in millions	38	6,77	9,24	38	11,56	15,03	70,8
X_2	Adult literacy rate, (%)	33	13,55	10,01	32	34,09	19,02	151,6
X_3	Life expectancy at birth	38	39,47	4,31	38	48,92	7,02	23,9
X_4	Annual average rate of population increase (%)	38	2,49	0,59	38	2,79	0,66	12,0
X_5	Crude Birth rate (%)	38	48,42	3,36	38	46,87	4,06	-3,2
X_6	Crude Mortality Rate (%)	38	25,11	3,29	38	17,71	3,96	-29,5
X_7	Total fertility rate	38	6,13	1,29	38	6,55	0,68	6,9
X_8	Infant mortality quotient (%)	38	197,13	98,80	38	128,71	31,69	-34,7
X_9	Child mortality quotient (%)	38	41,61	12,15	38	25,97	9,82	-37,6
X_{10}	Average index of food production per inhabitant (%)	38	93,95	11,93	38	92,87	12,33	-1,1
X_{11}	Annual average inflation rate (%)	38	4,01	4,85	38	12,68	6,78	216,2
X_{12}	Variation in crude mortality rate (%)	-	-	-	38	29,59	9,41	-
X_{13}	Percentage of population with access to safe water	-	-	-	30	32,03	21,50	-
X_{14}	Daily calorie intake per inhabitant (%)	32	88,93	8,65	38	95,03	11,42	6,9
X_{15}	Number of boys enrolled in primary school	37	51,66	27,11	36	81,86	34,32	58,5
X_{16}	Number of girls enrolled in primary school	37	26,54	21,61	36	61,22	34,19	130,7
X_{17}	Annual rate of increase of urban population	38	5,27	1,93	38	5,91	1,75	12,1
X_{18}	Percentage of active population working in services	38	12,45	11,63	38	16,58	10,72	33,2
X_{19}	Percentage of active population working in industry	38	9,16	13,34	38	11,92	8,03	30,1
X_{20}	Urban population as percentage of total population	38	15,76	15,73	38	23,50	14,32	49,1
X_{21}	Per capita (GNP in US dollars)	38	377,00	725,00	37	479,00	374,00	27,1
X_{22}	Population per hospital bed	30	1115,00	985,00	32	878,00	710,00	-21,3

Table 2: Correlation matrix of demographic and socio-economic indicators (1980)

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}
X_1	-										
X_2	0,067	-									
X_3	0.049	0.368(+)									
X_4	-0.078	0.204	0.202								
X_5	-0.029	-0.229	-0.314(+)	0.271(+)							
X_6	-0.131	-0.640(*)	-0.791(*)	-0.326(+)	0.446(.)						
X_7	-0.042	-0.020	-0.089	0.460(.)	0.886(*)	0.124					
X_8	-0.149	-0.686(*)	-0.552(*)	-0.251	0.247	0.615(*)	0.001				
X_9	-0.178	-0.653(*)	-0.590(*)	-0.250	0.331(+)	0,671(*)	0.047	0,982(*)			
X_{10}	-0.167	0.271	0.066	0.204	-0.173	-0.214	0.072	-0.176	-0.243		
X_{11}	0.231	0.310(+)	0.041	0.122	0.013	-0.124	-0.011	-0.225	-0.205	-0.042	
X_{12}	0.106	0.456(.)	0.709(*)	0.287(+)	-0.541(*)	-0.850(*)	-0.241	-0.449(.)	-0.526(*)	0.150	0.057
X_{13}	0.160	0.308	0.322(+)	0.210	-0.356(+)	-0.523(*)	-0.056	-0.363(+)	-0.509(*)	0.542(*)	0.165
X_{14}	-0.082	0.403(.)	0.401(.)	0.150	-0.321(+)	-0.531(*)	-0.085	-0.438(.)	-0.508(*)	0.624(*)	0.049
X_{15}	0.072	0.620(*)	0.727(*)	0.360(.)	-0.325(+)	-0,714(*)	-0.085	-0.609(*)	-0.616(*)	0.150	0.062
X_{16}	0.003	0.720(*)	0.633(*)	0.341(.)	-0.269	-0.713(*)	-0.017	-0.632(*)	-0.619(*)	0.186	0.108
X_{17}	-0.163	0.092	-0.017	0.473(*)	0,229	0.089	0,255	-0,085	-0.055	0.088	0.004
X_{18}	0,213	0.141	0.409(.)	0.049	-0.186	-0.497(*)	-0,063	-0.169	-0,218	-0,254	0.034
X_{19}	0.296(+)	0,111	0.465(.)	-0.144	-0.459(.)	-0,541(*)	-0.365(+)	-0.079	-0.157	-0.258	0.014
X_{20}	0.130	0.22	0.289(+)	-0.021	-0.454(.)	-0.410(.)	-0.360(+)	-0.171	-0.245	-0.093	0.006
X_{21}	0,258	0.250	0.411(.)	0.163	-0.295(+)	-0.522(*)	-0.096	-0.258	-0.325(+)	-0.052	-0.068
X_{22}	0 255	-0.585(*)	-0,454(.)	-0.293(+)	0,412(.)	0,597(*)	0.229	0,392(*)	0.410(.)	-0.355(+)	-0.193

Table 2: Correlation matrix of demographic and socio-economic indicators (1980)

	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}	X_{21}	X_{22}
X_{13}	0.426(.)										
X_{14}	0.340(+)	0.578(*)									
X_{15}	0.658(*)	0.293(+)	0,401(.)								
X_{16}	0.581(*)	0.287	0.407(.)	0.907(*)							
X_{17}	-0.068	-0.067	-0.117	0.197	0.323(+)						
X_{18}	0.519(*)	0.214	0.134	0.417(.)	0.290(+)	-0.338(+)					
X_{19}	0.563(*)	0.270	0.145	0.345(+)	0.199	-0.441(.)	0.780(*)				
X_{20}	0.497(*)	0.231	0.269	0.332(+)	0.141	-0.262	0.616(*)	0.625(*)			
X_{21}	0.592	0.338(+)	0.304(+)	0.406(.)	0.313(+)	-0.122	0.750(*)	0.579(*)	0.752(*)		
X_{22}	-0.531	-0.427(.)	-0.486(.)	-0.646(*)	-0.635(*)	0.064	-0.197	-0.211	-0.278	-0.208	-

Meaning of correlation coefficients: α = 0.001(*); α = 0.01 (.); α = 0.05 (+),

The coefficients which are not marked with these three signs (*, . or +) are not meaningful at the threshold α = 0.05.

Annex A

List of demographic and socio-economic indicators

X_1 : Population in millions, 1980

X_2 : Adult literacy rate, per cent, 1977

X_3 : Life expectancy at birth, 1980

X_4 : Annual average rate of population increase, per cent, 1970-1980

X_5 : Crude birth rate, per cent, 1980

X_6 : Crude mortality rate, per cent, 1980

X_7 : Total fertility, 1980

X_8 : Infant mortality quotient, per cent, 1980

X_9 : Child mortality quotient, per cent, 1980

X_{10}: Average index of food production per inhabitant, 1978-80, base : 1969-71 = 100

X_{11}: Annual average inflation rate, per cent, 1970-80

X_{12}: Variation in crude mortality rate between 1960 and 1980 (per cent)

X_{13}: Percentage of population with access to safe water in 1975

X_{14}: Daily calorie intake per inhabitant as percentage of needs, 1977

X_{15}: Number of boys enrolled in primary school as a percentage of pertinent age group, 1979

X_{16}: Number girls enrolled in primary school as a percentage of pertinent age group, 1979

X_{17}: Annual rate of increase of urban population, per cent, 1970-80

X_{18}: Percentage of active population working in services, 1980

X_{19}: Percentage of active population working in industry, 1980

X_{20}: Urban population as percentage of total population, 1980

X_{21}: Per capita Gross National Product in US dollars, 1980

X_{22}: Population per hospital bed, 1980